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Ms. Wendy R. Dixon, EIS Project Manager
U.S. Department Of Energy; Office of Civilian Radioactive Waste Management
Yucca Mountain Site Characterization Office
P.O. Box 30307, MS-010
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Dear Ms Dixon:

Subject: Depleted Uranium (DU) and Yucca Mountain Repository

Enclosed are my comments and recommendations on the *Draft Environmental Impact Statement (EIS) for a Geological Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada (DOE/EIS-0250-D)*.

RECOMMENDATION

- 1 **The Yucca Mountain Environmental Impact Statement (YM-EIS) should include the option of emplacement of depleted uranium (DU) in the repository as a useful material and/or as a waste.**

BASIS FOR RECOMMENDATION

- 1 cont. The United States has an inventory of ~500,000 tons of radioactive DU, which is a secondary product from the production of (1) commercial spent nuclear fuel, (2) navy and research reactor fuel, and (3) nuclear weapons. Much of this material may ultimately become a waste. Geological disposal is the preferred option for disposing of large quantities of DU. DU is not included in the draft YM-EIS (pg 8-60). The basis for this recommendation to include DU in the YM-EIS is as follows:

1. *U. S. Nuclear Regulatory Commission (NRC) actions clearly indicate that geological disposal of DU is the preferred option for disposal of DU.*

The NRC, in the licensing application¹ for the Claiborne Enrichment Plant, stated, "Our analysis, using methodology similar to that used for the Part 61 of the EIS, concludes that near-surface disposal of such large quantities of DU tails is not appropriate, both because of its potential radiological impact and its chemical toxicity. However, other disposal alternatives under 10 CFR Part. 61 may be viable; e.g., deep mine disposal."

The draft YM-EIS (Section 8.1.2) includes, for disposal in the repository, wastes defined by the NRC as Greater-Than-Class-C (GTCC) low-level wastes (LLWs). GTCC LLWs are the most hazardous category of LLW. Shallow-land disposal is acceptable for most LLW; however, the NRC has determined that shallow-land disposal is not suitable for GTCC LLW. Geological repository disposal of GTCC LLW is appropriate and is accepted by the NRC. The NRC, by stating that the acceptable DU disposal options are those reserved for GTCC LLW, indicated that large quantities of DU should be disposed of as a type of GTCC LLW. To be consistent with the NRC and consistent with other parts of the YM-EIS, DU should be included in the YM-EIS.

When the NRC defined waste categories (10 CFR Part. 61), no significant quantities of DU were owned by private organizations; consequently, DU was not considered in the definition of LLWs. The licensing application for the Claiborne Enrichment Plant was the first time the NRC could address disposal of DU. The NRC explicitly stated that it is *the large quantities of DU* with the associated risks that necessitate that DU be treated equivalent to GTCC LLW. The NRC recognizes that small quantities of uranium are found everywhere in the natural environment and present an acceptable risk.

- 1 cont. 2. *The "Final Programmatic Environmental Impact Statement (PEIS) For Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride" raises serious questions about the viability of non-repository DU disposal options.*

This PEIS stated² that if shallow land disposal of DU was undertaken, the radiation doses to the most exposed individuals, via groundwater, would be about 110 mrem/year in wet climates within a 1000 years. Significantly higher radiation doses (~10 rad/year) in wet or dry climates would ultimately occur if the cover material were eroded away. To reduce doses to allowable regulatory levels (25 mrem/year) using shallow land disposal (if feasible) may require very difficult and expensive engineering compared to disposal in the proposed YM repository.

- 1 cont. 3. *Disposal of DU in a repository assures a consistent waste management philosophy.*

The waste management philosophy of the United States has been that wastes should be isolated from man. Shallow land disposal is acceptable for disposal of short-lived radionuclides that decay away before the disposal site fails. Repositories are required to prevent long-term release of long-lived radionuclides to the environment. The hazards of DU are from long-lived radionuclides and increase with time because of the buildup of radium and radon decay products over several thousand years. Comparisons of the toxicity of different repository wastes show that the toxicity of DU will exceed the toxicity of many of those wastes within thousands to millions of years. It is illogical to build a repository for some long-lived radioactive wastes and then decide that other long-lived radioactive wastes will not be handled with equal care.

COMPARISON WITH OTHER REPOSITORY OPTIONS

- 2... There are several repository options for DU: the YM Repository, the Waste Isolation Pilot Plant (WIPP), or a new facility. For several reasons YM is preferred.

1. *The health and environmental impact will be low.*

The draft YM-EIS indicates that the DU disposal in YM would not significantly impact the environment. Spent nuclear fuel is primarily uranium. The analysis shows that SNF uranium (up to 105,000 metric tons) does not significantly contribute to the radiation hazards (Table 5-11) or chemical hazards (pg 5-41) associated with the repository. The health and environmental impact of DU would be less than SNF uranium because DU contains lower concentrations of the more radioactive uranium isotopes. Furthermore, the YM Project has conducted a separate preliminary assessment of the impact of DU on the repository. That assessment³ also indicated that there would be no significant radiation exposures to the public from adding the DU to the repository.

2. *YM is a civilian repository.*

YM is designed for those civilian radioactive wastes for which shallow-land disposal is not acceptable or desirable. Much of the DU is from the commercial nuclear fuel-cycle industry and most future DU will be from this source. Acceptance of DU by the YM repository for disposal or use is within the fundamental mission of the YM repository.

3. *There are potential beneficial uses of DU in YM that may (1) improve the performance of YM and (2) make YM the low-cost disposal option for DU.*

DU may improve the performance of the proposed YM repository. The U.S. Nuclear Waste Technical Review Board^{4,5}, the Congressionally mandated technical review board for YM, has recommended consideration of the disposition of DU at YM to solve repository nuclear criticality issues and improve SNF disposal. Technical studies⁶ have shown how the use of DU in the repository may reduce the long-term radionuclide release rate from the repository. Such use of DU in YM may reduce total costs to the taxpayer and electric-utility ratepayer by avoidance of disposal costs for DU.

REFERENCES

1. J. W. N Hickey, *Letter from J. Hickey, Chief Fuel Cycle Safety Branch, U.S. Nuclear Regulatory Commission To Louisiana Energy Services, L. P.*, Docket No. 70-3070 (U.S. Nuclear Regulatory Commission, Washington D.C., Sept. 22, 1992).
2. U.S. Department of Energy, pp. I-19 in *Final Programmatic Environmental Impact Statement For Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride*, DOE/EIS-0269, Washington D.C., April 1999.
3. Joshua Owen, *Potential Disposal of Depleted Uranium in The YMP Subsurface Repository*, Yucca Mountain Project Office, U.S. Department Of Energy, Las Vegas, Nevada, July 27, 1999.

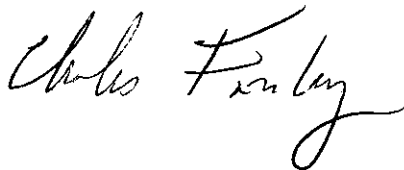
2 cont.

4. U.S. Nuclear Waste Technical Review Board, *Report to the U.S. Congress and the Secretary of Energy: January to December 1996*, Washington, D.C. 1997.
5. U.S. Nuclear Waste Technical Review Board, *Report to the U.S. Congress and the Secretary of Energy: 1995 Findings and Recommendations*, Washington D.C., April 1996.
6. C. W. Forsberg, "Advanced Spent-Fuel Waste Package Fill Material: Depleted Uranium Dioxide," p. 52 in *Trans. 1999 Winter Meeting American Nuclear Society, Long, Beach, California, November 14-18, 1999*, La Grange Park, Illinois, November 1999.

OTHER

If there are any questions, please contact me.

Sincerely:

A handwritten signature in cursive script that reads "Charles Forsberg". The signature is written in black ink and is positioned above the printed name.

Dr. Charles Forsberg